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NOTES ON THE FLORA OF YOSEMITE AND ADJACENT REGIONS

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I shall not try to make an extensive paper on the flora of the Yosemite, but merely to record my impression of this interesting floristic region. To persons who wish to become familiar with the region the following papers and books will be of interest: The United States Park Service has published an interesting folder on the Yosemite National Park,[1] the Hall[2] Yosemite Flora, John Muir's general account [3], Jepson[4] on the trees of California, Brewer and Watson,[5] botany of California, a well known treatise. The work of W. L. Jepson,[6] The Flora of Western Middle California, describes the plants of western and middle California and often refers to the plants of the Sierras. It is an interesting change from the flora of the San Joaquin Valley to the flora of the Sierras. In the San Joaquin Valley as in the Sacramento there is a maximum of sunshine and a rainfall somewhat limited to the winter months. In this region there is a wealth of vernal flowering plants, making the fields aglow with the California poppies (*Eschscholtzia Californica*), Brodiaeas (*B. minor*), *Chlorogalum angustifolium* and many others which disappear during the hot summer months and are succeeded in the cultivated fields and roadsides by a lot of homely weeds like goosefoot (*Chenopodium album*), tumble weed (*Amaranthus graecizans*), smartweed (*Polygonum Persicaria*), gourd (*Cucurbita foetidissima*), camphor weed (*Trichostema lanceolatum*), horehound (*Marrubium vulgare*), tar weed (*Hemizonia luzulaefolia*), tocalote (*Centaurea melitensis*), Barnaby's thistle (*Centaurea solstitialis*), purslane (*Portulaca oleracea*), common plantain (*Plantago major*), barley (*Hordeum murinum*), wild oats (*Avena fatua*), crab grass (*Digitaria sanguinalis*), blue curls (*Trichostema lanceolatum*), barn yard grass (*Echinochloa crus-galli*), Johnson grass (*Sorghum*

1 Dept. of Interior, National Park Service, 1-77, 4 pl; 1920.

2 Hall, H. M. and C. C., 1-282; 1912.

3 The Yosemite, 1-284; 1912.

4 The Silva of California; Memoirs Univ. Calif., 2: 1-480, pl. 1-85, maps 1-3, f. 1-11; 1910.

5 Botany Calif., Geol. Survey, 1: 628; 1876, 2: 1-539; 1889. Polypetalae, Brewer and Watson; Gamopetalae, Gray.

6 A flora of Western Middle California, 2d Ed., 1-515.

Fig. 1. General view of Yosemite region. Vernal and Nevada Falls to the right

halepense) and many others which occur in late summer. Except for the more or less fleshy leaved kinds the plants of the fields are dry. Barnyard grass, Johnson grass, crab grass and other plants of this type are green only near irrigated ditches. The foothills show only the dried remains of wild oat (*Avena fatua*) and tall meadow oat grass (*Arrhenatherum elatius*), *Hordeum murinum* and *H. maritimum* var *gussonianum*. Along the San Joaquin and its smaller tributaries the valley oak (*Quercus lobata*), a beautiful tree with spreading pubescent branches, is frequent. The cottonwood (*Populus Fremontii*) occurs along living streams and willows like the sandbar willow (*Salix fluviatilis*), the black willow (*S. nigra*) and the arroyo willow (*S. lasiolepis*) as well as the box elder (*Acer negundo* var *Californicum*) and the ash (*Fraxinus Oregona*), are more or less common. A difference, however, is observed in the foothills through which Merced river flows. The foothills here, as along all other streams of the Sierras, are more or less dry. Here may be found the Digger pine (*Pinus Sabiniana*) which usually forms a very thin stand. The large cones and thin gray foliage give the foothills a peculiar aspect. Digger pine is frequently associated with the California buckeye (*Aesculus Californica*) and the western red bud (*Cercis occidentalis*). Valley oak (*Quercus lobata*) may still occur and with it the Wislizenus oak (*Q. Wislizenii*). The Oregon ash (*Fraxinus Oregona*) occurs in the foothills along streams and was found at El Portal. In ascending the valley the aspect gradually changes, the bull pine (*Pinus ponderosa*) appears and

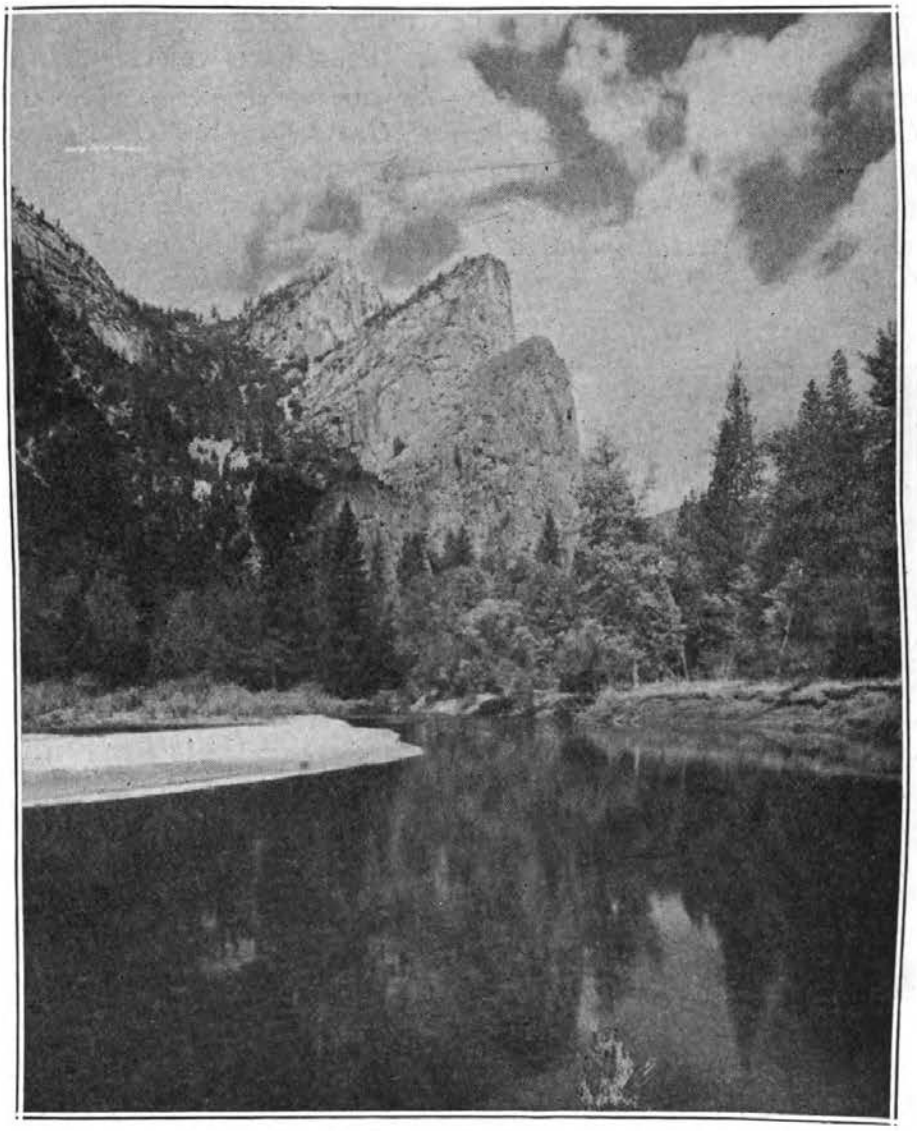

Fig. 2. Mirror Lake in the Yosemite with pine and fir in back ground.

with it in the moist canyons the large leaved maple (*Acer macrophyllum*) and an occasional stinking yew (*Tumion Californicum*), which is a rather rare tree, and unique among the California conifers. The Douglas fir (*Pseudotsuga taxifolia*) also appears as well as the incense cedar (*Libocedrus decurrens*), another of the unique North American conifers. In shady nooks where there is an abundance of moisture the beautiful *Woodwardia radicans* appears and in dry woods the widely distributed *Pteris aquilina*. The white fir (*Abies concolor*) is widely distributed in the Rockies and is a fine tree. The beautiful red fir (*A. magnifica*) occurs at higher altitudes. The hillsides contain

numerous species of the so-called lilacs, species of *Ceanothus*, members of the family Rhamnaceae. These have white or bluish colored flowers. I collected the following species in the region: *Ceanothus thyrsiflorus, C. cordulatus, C. cuneatus* and *C. prostratus*. Some of the species are prostrate, others are erect. There are few twining plants in the region. The only common species in the lower Merced valley is the California grape (*Vitis Californica*).

The California nutmeg (*Umbellularia Californica*), with aro-

Fig. 3. Yosemite Falls. In the foreground lodge pole, yellow pine, fir and cottonwood. The blotches on the mountain sides are largely golden cup oak

matic leaves, is abundant on the mountain slopes. Many other trees and shrubs, some of which will be referred to later, occur in the valley below the moraine at the lower end of the Yosemite. Flowing through the valley is Merced river. This valley is an old lake and is about seven miles long and a mile or so wide. It is for the most part now covered with trees, the remainder consisting of open meadows which have been spoiled by the intensive grazing. The beautiful meadows spoken of by earlier writers are a thing of the past. The moraine is situated between the famous El Capitan and Bridal Veil Falls. El Capitan rises 3604 feet above the floor of the valley. The Bridal Veil Falls are 620 feet high, while the Yosemite falls are 1430 feet high.

The most marked features of the floor of the Yosemite Valley from the standpoint of vegetation are the large and superb speci-

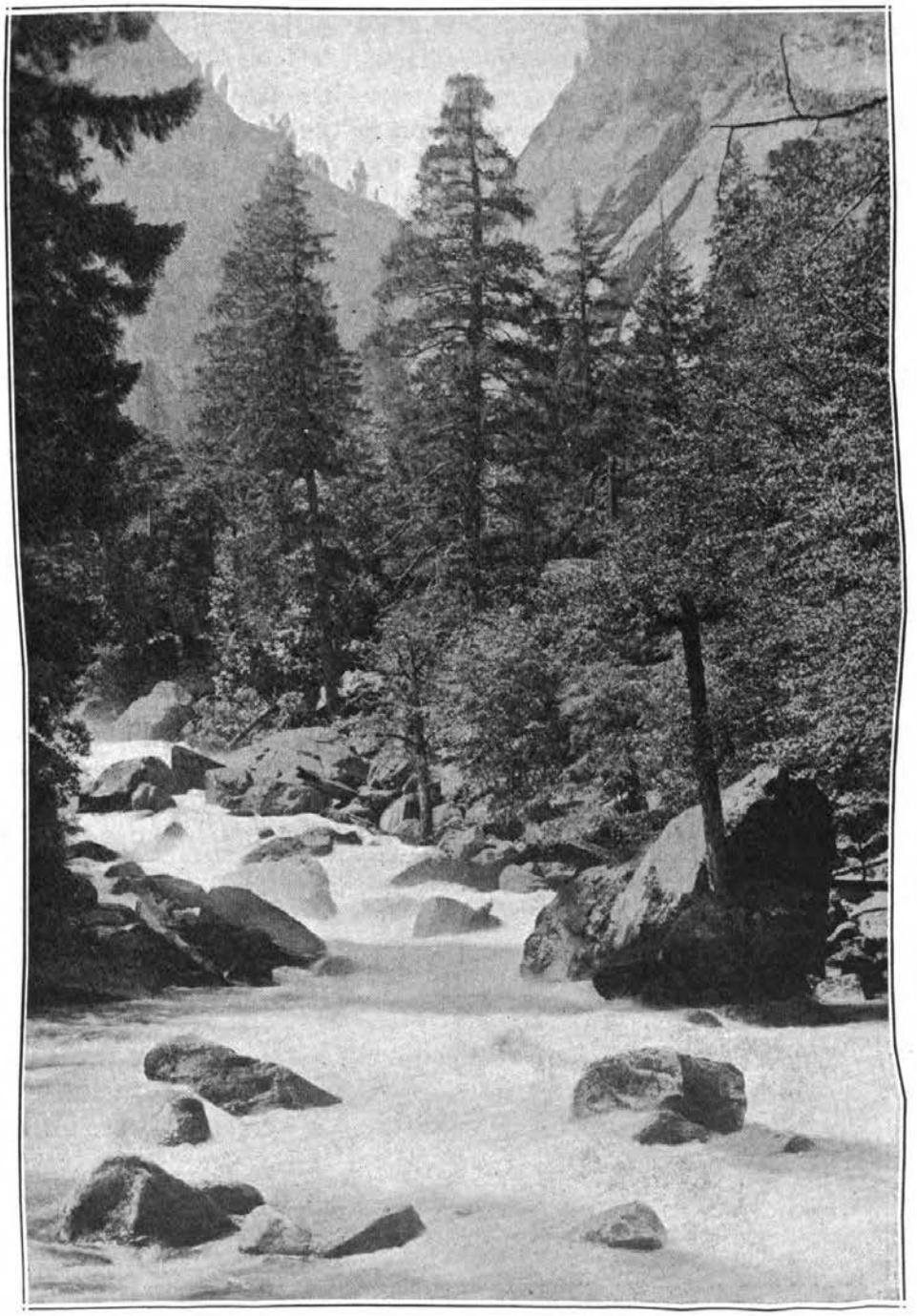

Fig 4. Merced river. Incense cedar, fir and pine. Above Happy Isles.

mens of the yellow pine (*Pinus ponderosa*), the fine and magnificent trees of *Libocedrus decurrens* and a few large sugar pines (*Pinus Lambertiana*). The latter species is not common in the floor of the valley — a few trees occur near the moraine on the

banks of Merced river and a few more on the banks of the same stream a half mile above the village. A few small lodge pole pines (*Pinus Murrayana*) are scattered through the yellow pine groves. There is but little variation in the elevation of the floor of the valley or in the character of the soil. In the more or less gravelly soil there are abundant and fine specimens of the California oak (*Quercus Kelloggii*), a most graceful, beautiful tree with broad, rounded top, whose leaves resemble those of our eastern quercitron oak (*Q. velutina*). The acorn and cup also resemble those of this eastern species, except that the acorns are larger. On the mountain slopes and often in rocky soil another species of oak commonly known as the golden cup or maul oak (*Q. chrysolepis*) occurs. It is an extremely variable oak; the leaves are ovate, entire or toothed, green above and yellowish beneath, sometimes covered with pubescence. These variations occur on the same tree and the same branch. This oak is common on the slopes in the valley up to altitudes of 7,000 feet. A related species, *Q. vaccinifolia*, is sometimes called the Huckleberry oak because of the resemblance of the leaves to those of the huckleberry. The species is common at higher altitudes in the Sierras. I found it in great quantities on Feather river near Gold Lake where it covered great stretches, forming a dense undergrowth. The acorn somewhat resembles that of the white

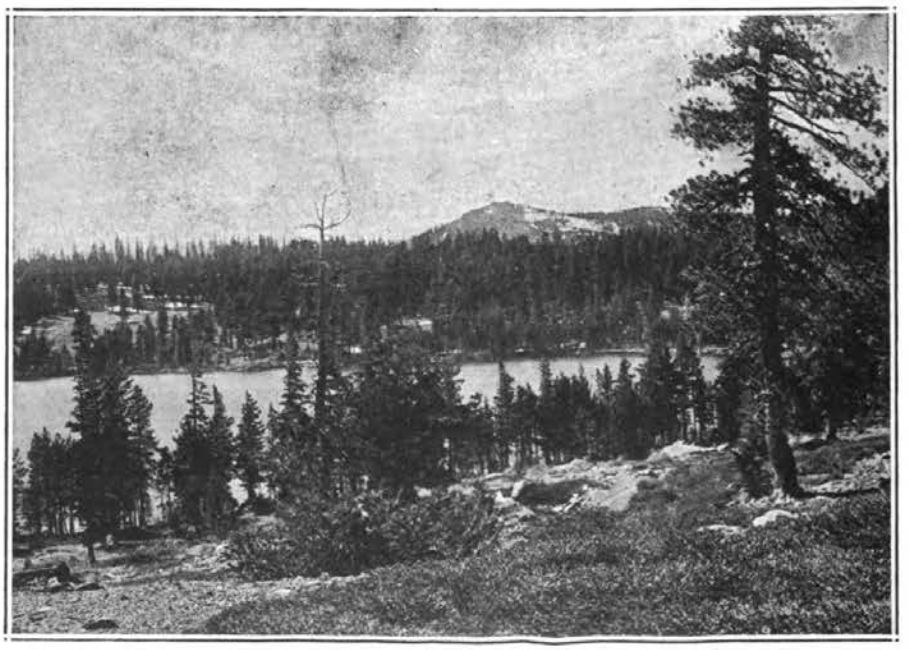

Fig. 5. Gold Lake near Feather River Canyon on line Western Pacific Railroad. Lodge pole pine, some white pine (*Pinus monticola*).

oak. The chinquapin (*Castanopsis sempervirens*), related to the eastern chinquapin (*Castanea pumila*), is a spreading shrub from one to eight feet high, with evergreen leaves, erect, staminate catkins several inches long and bearing white flowers. Small spiny burs cover the nuts. The species was common at Chinquapin, forming a dense growth. It was just in bloom about the last of August.

In the flood plain of the stream and in some places in the valley there were great quantities of black cottonwood (*Populus trichocarpa*), a tree with somewhat variable leaves, bright green above and rusty brown below. The trees of the valley are not large, generally from forty to eighty feet high, 1½ to 2½ feet in diameter. There is only one other species of this genus in the region, namely the quaking aspen (*Populus tremuloides*). This is not what one would expect because in the Rockies *P. tremuloides* is one of the most common species of the genus. I saw only a few trees, at the head of a little open somewhat boggy area near Crane Flat. It is reported at several other points at altitudes over 6,000 feet.

The white alder (*Alnus rhombifolia*) is common on the banks of streams through the Sierra canyons along with several species of willow (*Salix*) western azalea (*Rhododendron occidentale*) with its beautiful white or pinkish corollas, the flowering dogwood (*Cornus Nuttallii*) and the common dogwood (*Cornus pubescens* var *Californica*). The little mountain maple (*Acer glabrum*) which is especially common near Mirror Lake and the higher slopes of the mountains, is an interesting mountain species. The big tree (*Sequoia Washingtoniana*) occurs several thousand feet above the floor of the Yosemite valley. I visited only two groves; the one near Crane Flat and the well known Mariposa grove in a glaciated region. The trees are found on the slope and in the little narrow valleys. There is in this region always an abundance of moisture from the abundant rainfall and the melting snow. The little valleys have fine springs. The big trees are associated with sugar pine, *Alnus*, *Salix*, *Erigeron* and other species of plants needing an abundance of moisture. The trees are either very old or very young; there are no medium sized trees. These trees are California's most marvelous production. Fortunately the Government is trying to save most of them.

In a previous paragraph the statement was made that the floor of the valley is fairly uniform in character. At one time the open meadows were covered with an interesting lot of herbaceous plants. Severe grazing has destroyed many of the fine meadow

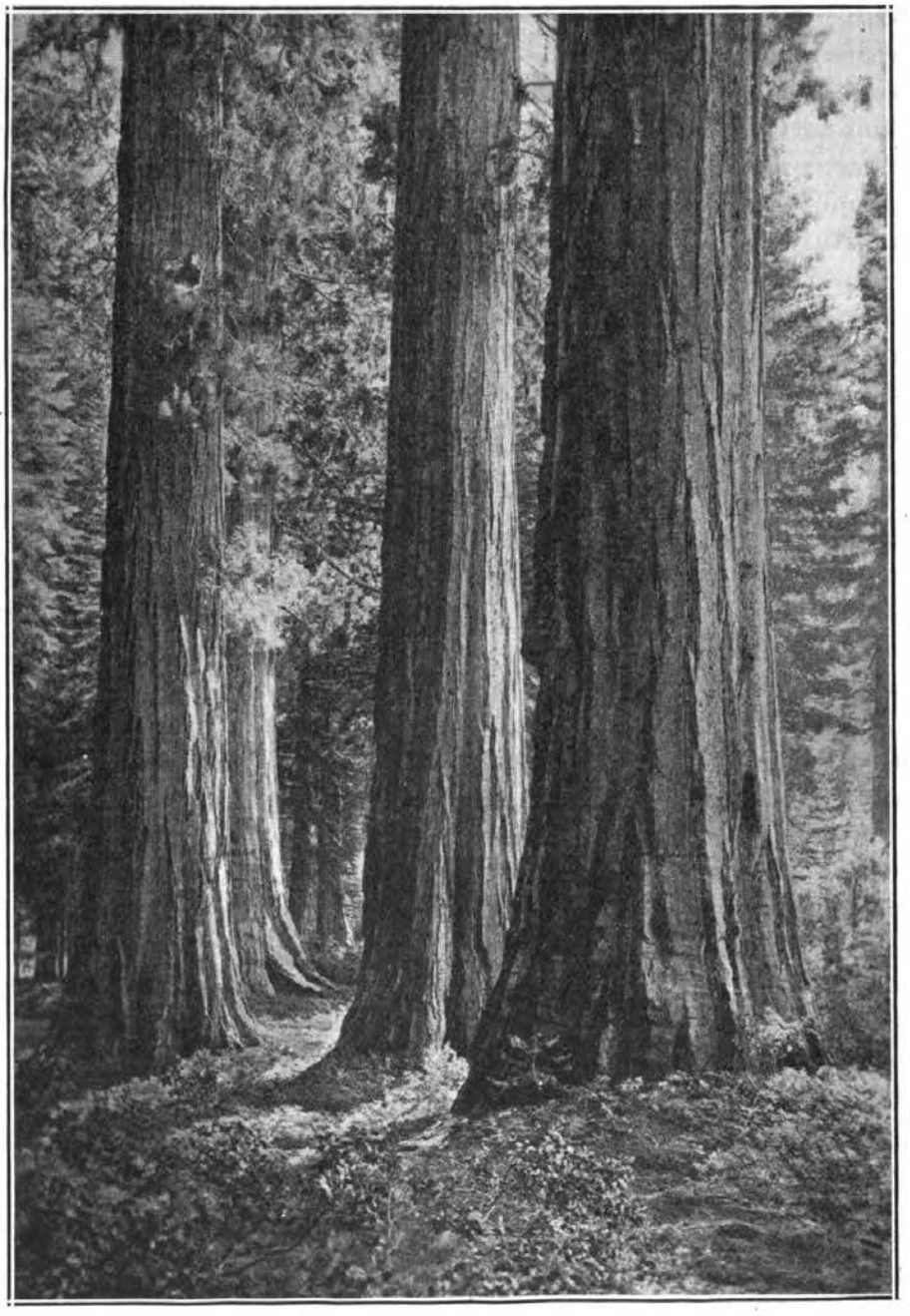

Fig. 6. The big tree (Sequoia Washingtonia) in the Yosemite National Park, Mariposa Grove

species. The white flowered smartweed (*Polygonum bistorta*) is rarely found though it is said to have been common at one time. The large yellow flowered evening primrose (*Oenothera grandiflora*) is abundant, and the large yellow flowers form an interesting feature of the region. Several species of *Gayophytum* are

common in the gravelly soil. The enchanter's nightshade (*Circaea pacifica*) is frequent in moist shady woods near springs. *Godetia viminea* with purple flowers and fireweed (*Epilobium angustifolium*) form showy masses in open woods. This latter species is more common northward into British Columbia in the Rocky Mountains and northern United States. Of the Compositae the following may be mentioned: the yarrow (*Achillea Millefolium*), wormwood (*Artemisia dracunculoides*), thistle (*Cirsium Californicum*), *Wyethia angustifolia*, everlasting (*Anaphalis margaritacea*), *Chrysopsis villosa* var *Bolanderi*, goldenrod (*Solidago occidentalis* and *S. Californica*). A species of Lessingia is common in open gravelly places in the floor of the valley. The common horseweed (*Erigeron canadensis*) is naturalized in many places as is the tumbling mustard (*Sisymbrium altissimum*). There are several species of monkey flowers but the most interesting and beautiful is the cardinal monkey flower (*Mimulus cardinalis*), a perennial with villous pubescent stems and bright scarlet flowers. It is common in the vicinity of springs and little rivulets. A yellow flowered monkey flower (*Mimulus floribundus*) with slimy viscid musk-scented leaves is common also in springy places. The figwort (*Scrophularia Californica*) is common in the Sierras, especially in moist gulches.

In moist ravines near springs in the Yosemite valley there are sometimes great quantities of cleavers (*Galium aparine* and *Galium trifidum*) of the madder family Rubiaceae. There are not many plants of the honeysuckle family Caprifoliaceae. At El Portal and in the floor of the valley the slopes of hills and rocky places contain considerable quantities of the blue elderberry (*Sambucus glauca*), whose bluish fruit with a whitish bloom is quite striking. The California honeysuckle (*Lonicera hispidula* var *Californica*) is common in canyons along streams.

Of the mint family (Labiatae) the fragrant *Monarda lanceolata* with rose-purple corolla occurs in the foothills. The common mint (*Mentha canadensis*) is not uncommon in marshes. Self heal (*Prunella vulgaris*) is common in the floor of the valley. The European horehound (*Marrubium vulgare*) is a common naturalized weed in the great valley and in the foothills. It occurs commonly at El Portal. Of the milkweed family (*Asclepiadaceae*) our *Asclepias speciosa* is common as well as *A. cordifolia*. The *Apocynum cannabinum* of the Apocynaceae is common in the valley. The beautiful western azalea (*Rhododendron occidentale*) of the Ericaceae occurs in many places in great profusion overhanging small streams. The wild ginger (*Asarum Hart-*

wegii) of the Aristolochiaceae is common in deep shady woods of the Yosemite. The dogwood family (Cornaceae) is represented by the flowering dogwood (*Cornus Nuttallii*) with flowers in sessile heads surrounded by several large white petal-like bracts and a scarlet drupe, much like our eastern flowering dogwood but a larger tree. The common dogwood of river banks is the *Cornus pubescens* var *Californica* with purplish branches. The bear brush (*Garrya Fremontii*) of the Garryaceae occurs as a small shrub or tree with simple opposite leaves and dioecious flowers borne in a long pendant-like catkin.

Of the carrot family one of the most characteristic plants in marshy places is the cow parsnip (*Heracleum lanatum*), while the sweet cicely (*Osmorrhiza occidentalis*) is common in woods. The turkey mullein (*Eremocarpus setigerus*) is a rather common weed in the foothills at El Portal and forms close mats on the ground. The thyme-leaved spurge (*Euphorbia serpyllifolia*), with forked branches, also forms prostrate mats on the ground. Of the Leguminosae the Spanish clover (*Lotus americanus*) is common in open places in the foothills. There are also several beautiful species of lupines (*Lupinus* sp.) in open parks. There are several cherries in the Sierras of which the most widely distributed is the western choke cherry (*Prunus demissa*) which also occurs throughout the Rocky Mountains. The drupes are bright red and astringent. The species is more or less gregarious. The service berry (*Amelanchier alnifolia*), common in the Rockies, is another Sierra species. Two species of *Rubus* are rather common, the thimble berry (*Rubus Nutkanus*) and the common blackberry (*Rubus vitifolius*). The mountain mahogany (*Cercocarpus parvifolius*) with its grayish branches and tailed fruit is a common shrub or small tree in dry exposed situations near Wawona and in the Merced canyon. The California wood rose (*Rosa gymnocarpa*) with pear shaped red fruit, is common in woods. The nine bark (*Physocarpus capitatus*) is a gregarious shrub on north slopes of mountains, on the south bank of Tuolumne river near a grove of big trees. The meadow sweet (*Holodiscus discolor* var *ariaefolius*) is one of the common shrubs in granitic rock in the vicinity of Bridal Veil Falls. There are several interesting plants of the gooseberry family (Saxifragaceae), such as the California mock orange (*Philadelphus Lewisii* var *Californicus*), frequent along streams in the Yosemite valley. There are also several species of *Ribes*.

Common pepper grass (*Lepidium apetalum*) of the family Cruciferae is a common naturalized weed of the Yosemite Valley, as

is also shepherd's purse (*Capsella bursa-pastoris*), radish (*Raphanus sativus*) and the tumbling mustard (*Sisymbrium altissimum*). *Streptanthus orbiculatus* occurs in the Yosemite Valley. The California poppy (*Eschscholtzia Californica*) of the family Papaveraceae grows as freely in the Yosemite as in other parts of California. The California strawberry bush (*Calycanthus occidentalis*) of the Calycanthaceae is common in moist canyons and streams and is found in the lower Merced between El Portal and the lodge. There are also representatives of *Aquilegia, Delphinium, Clematis* (*C. ligusticifolia*), *Thalictrum,* Spatter dock (*Nuphar polysepalum*), *Arenaria, Silene, Aster, Erigeron, Juncus, Carex, Scirpus.* There are several interesting mistletoes. The incense cedar mistletoe (*Phoradendron Libocedri*) was frequently observed on the road to Wawona from the Yosemite Valley. The oak mistletoe (*Phoradendron villosum*) is common on several species of oaks in the Merced Canyon between El Portal and the Yosemite and on the Wawona road from the valley, especially on *Quercus chrysolepis* and *Q. Californica.* The cottonwood mistletoe (*Phoradendron flavescens*) is often found on the cottonwood in the San Joaquin Valley. The *Arceuthobium occidentale* is fairly common on the yellow pine in the Yosemite Valley.

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